Original Article

Effect of supported sitting position during second stage of labor on its outcome in primigravidae: A quasi-experimental study

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Abstract

Background: The childbirth position has a significant influence on labor, maternal comfort, and neonatal outcome. In sitting position, there is a faster fetal descent with the effect of gravity. The information on this subject is relatively scant. Therefore, this study aimed to examine the effect of a supported sitting position during second stage of labor on its outcome in primigravidae. **Materials and Methods:** A quasi-experimental study with a post-test only control group design was used. 60 primigravidae were selected using total enumerative sampling. The labor outcome was assessed by self-structured maternal neonatal outcome checklist and socio-demographic proforma. **Results:** Statistically significant difference was observed on the mean duration of second stage of labor among primigravidae in control and experimental group ($t = 5.87$, $P < 0.001$) and also in the APGAR score of newborns ($t = -3.98$, $P < 0.001$). A statistical significant association of duration of second stage of labor with height and intensity of maternal work was also observed. **Conclusions:** A supported sitting position during labor was found to be effective in reducing duration of the second stage of labor. This can be used as a nursing intervention while providing care during labor especially at primary healthcare centers that can help in reducing the duration of second stage of labor.

Keywords: Apgar score, second stage labor, sitting position

Introduction

Labor is a normal physiological process divided into four stages. The second stage of the labor process begins with fully dilated cervix and completes with the birth of a newborn.[1] It is divided into a propulsive phase when uterine contractions are at their peak and an expulsive phase when the baby actually emerges out from the birth canal. The second stage of labor is considered the most stressful during birthing process. The prolonged duration of second stage may lead to maternal and neonatal complications.[2] Upright position during this time increases maternal satisfaction and has more positive labor consequences.[1] Lamaze International (Certified Childbirth Education Organization) has recommended six healthy birth practices adapted from WHO (World Health Organization) to promote normal childbirth process. These are letting labor begin naturally, position change throughout labor, support from a labor companion, avoiding unnecessary medical interventions, pushing spontaneously in an upright position,

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and initiating early breastfeeding and skin to skin contact.[3] MRI (magnetic resonance imaging) studies have shown that the dimensions of the pelvic outlet become wider in upright position rather than in the supine position.[4] WHO has recommended use of upright positions during the second stage of labor with or without epidural analgesia.[5]

The number of deliveries taking place at the primary health centers has increased after operationalizing identifies primary health centers (Type B) to provide 24 × 7 delivery services. Mothers delivering at the primary health centers can be benefitted by providing supporting sitting position during labor. Family physicians also may find this supported sitting position useful in reducing the duration of labor and promoting normal vaginal delivery.

In recent times, majority of the women deliver in supine and semirecumbent positions. It is purported that supine positions help medical personnel and midwives to easily observe the progression of labor. It becomes convenient for them to implement hands-on maneuvers whenever required.[2] The Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) recommends that all women should have information about the benefits of upright position and nurses should discourage assumption of supine position during labor.[6]

Even after the WHO recommendations in hospitals and maternity centers, women are not getting the chance to deliver in an upright position. There is a paucity of data regarding this subject. A previous local study compared between supported sitting and lithotomy position during second and third stages of labor. They discovered shorter uterine contractions, intense pain, duration of the second and third stages of labor, and more spontaneous bearing down in a supported sitting position.[7] Therefore, this study would solely aim to identify the effect of a supported sitting position during the second stage of labor in primigravidae.

Materials and Methods

A quasi-experimental with post-test only control group design was used to examine the effect of supported sitting position on second-stage labor outcome. The study was carried out in the labor room of a tertiary care hospital, from April 30, 2021, to December 30, 2021. To prevent bias, the samples were first recruited for the control group and then for the experimental group using a total enumerative sampling technique based on subject selection criteria. Inclusion criteria: (i) age 18-35 years, (ii) gestational age ≥37 weeks, (iii) fetus in cephalic presentation, (iv) active stage of labor, and (v) lack of high-risk pregnancy. The sample size was computed from the study performed by Salvatore Gizzo *et al.* and continuous outcome formula.[8,9] An attrition rate of 10% added, and a total of 30 samples per group were needed to examine the differences between the groups. Samples in the control group received standard routine care. In the experimental group, informed consent and personal data were obtained before full cervical dilatation. At the initiation of second stage of labor and after full cervical dilatation (10 cm), the primigravida shifted to labor bed. The head of the bed was elevated at 60-90 degrees. The back was supported by placing a pillow behind. The feet were placed at the supporting stands attached around the bed. The upper body was supported by the labor companion/nurse researcher. Primigravida was bearing down while maintaining this sitting position. In-between rest periods were provided for 2-3 minutes. During episiotomy, the head end of the bed was again lowered to 30-45 degrees. A post-test was done after the delivery of newborn to measure the labor outcome.

A socio-demographic proforma containing age, height, weight, BMI, gestational age, education, and intensity of maternal work was used to collect data by the researcher. A self-structured maternal neonatal outcome checklist was completed by researcher to evaluate the labor outcome. The labor outcome was divided into maternal and neonatal outcomes. Maternal outcomes included duration of second stage of labor, mode of delivery, episiotomy, any perineal tear, any complications noted during delivery, blood loss more than 500 ml, and maternal vital signs. Neonatal outcomes included APGAR score, immediate cry, need for stimulation, need for resuscitation, and need for admission to the NICU.

The data were analyzed using International Business Machines (IBM) Statistical Package for Social Science (SPSS) software, version 20.0 for Windows 10. Each pair of data was tested for normal distribution using Kolmogorov–Smirnov, which revealed that data were normally distributed ($P \geq 0.05$). Therefore, descriptive and inferential statistics were used for data analysis. In descriptive statistics, frequency, percentage, mean, and standard deviation were calculated. An independent *t*-test was used for continuous variables. The Chi-square test and Fisher exact test were used for categorical variables and for determining the association of labor outcome with demographic variables. The level of significance was set at $P \leq 0.05$.

Ethical considerations

The study was approved by the Institutional Ethical Committee: AIIMS/IEC/2021/3481; approval date: 30 April, 2021. All samples were informed about the objectives and intervention used in the study. Initially, coding was done and informed consent was obtained. All samples were assured of confidentiality with the autonomy to withdraw themselves from the study at any point of time during data collection.

Results

Sample characteristics

A total of 60 samples participated in the study. Among them, 30 samples were allocated to each group. Mean age of subjects was 23.9 years in both groups. Mean weight of subjects in experimental and control group was 64.96 kg and 67 kg, respectively. The mean BMI was lower in the experimental group (24.96 kg/m^2) than the

control group (25.6 kg/m^2). Based on statistical analysis, there was no significant difference in the characteristics of samples between both groups ($P \geq 0.05$) [Table 1].

Comparison between maternal outcomes in experimental and control group

The mean duration of labor (in minutes) among the prmigravidae in the experimental group (34.37 ± 6.30) was found to be reduced by 10 minutes as compared to the mean duration in control group (44.70 ± 7.28). This difference was found to be statistically significant (t = 5.87, $P < 0.001$) [Table 2]. No statistically significant difference was found in the maternal outcome that included the mode of delivery, need for episiotomy, and the presence of complications among primigravidae in control and experimental groups [Table 3].

Table 1: Sample characteristics (*n*=60)

Demographic variables	Experimental group (*n*=30) *f* (%)	Control group (*n*=30) *f* (%)	*P*
Age (years)-			
18-22	12 (40)	15 (50)	0.59^{NS}
23-28	14 (46.7)	13 (43.3)	
29-35	4 (13.3)	2 (6.7)	
Mean±SD	23.9±3.14	23.9±6.9	
Height (cm)-			
147-155	2 (6.7)	5 (16.7)	0.41^{NS}
155-165	24 (80)	20 (66.7)	
165-175	4 (13.3)	5 (6.7)	
Mean±SD	161.3±3.9	161±4.16	
Weight (kg)-			
45-55	6 (20)	1 (3.3)	0.19^{NS}
55-65	11 (36.7)	16 (53.3)	
65-75	7 (23.3)	6 (20.0)	
>75	6 (20)	7 (23.3)	
Mean±SD	64.96±9.4	67±9.13	
BMI (kg/m^2)-			
18.5-24.9	16 (53.3)	13 (43.3)	0.71^{NS}
25-29.9	11 (36.7)	14 (46.7)	
≥30	3 (10)	3 (10)	
Mean±SD	24.96±3.62	25.6±2.6	
Gestational age-			
37-38+6 weeks	12 (40)	12 (40)	1.00^{NS}
39-41+6 weeks	18 (60)	18 (60)	
Education-			
Elementary	5 (16.6)	3 (10)	0.46^{NS}
Secondary	9 (30)	5 (16.7)	
Graduate	11 (36.7)	17 (56.7)	
Postgraduate	5 (16.7)	5 (16.7)	
Intensity of maternal work-			
Sedentary	4 (13.3)	11 (36.7)	0.06^{NS}
Moderate	24 (80)	19 (63.3)	
Heavy	2 (6.7)	0 (0)	

Level of significance $P \leq 0.05$, NS—nonsignificant, *—significant, *f*—frequency, BMI—body mass index

Comparison between neonatal outcomes in experimental and control group

The mean APGAR score in the experimental group (8.63 ± 0.56) was higher than the control group (7.93 ± 0.78). This difference was found to be statistically significant (t = -3.98, $P < 0.001$) [Table 4]. There was no significant difference found in immediate cry and need for stimulation [Table 5].

Association of labor outcomes with selected demographic variables

Only the height and intensity of maternal work in the experimental group were found to be significantly associated with the duration of the second stage of labor ($P \leq 0.05$). No significant association of demographic variables with APGAR score was found [Table 6].

Discussion

Upright positions are often recommended during labor, though women are instructed to deliver in a recumbent position. This study was carried out to assess the effect of a supported sitting position during labor on its outcome among primigravidae. The results revealed a significant effect of this position on duration of second stage of labor. An Indian study found compatible to these results, which reported that this position was associated with a shorter duration of labor during the second and third stages.[7] Another study compared pain level using the VAS scale and found less pain in semi-sitting (3.4) than supine position (7.86) ($P < 0.05$).[10] This indicates that the sitting position is not only effective in reducing the duration of labor but also promotes comfort for the women. A possible explanation of this mitigated labor pain must be a reduction in labor duration.

Although there was a complication that occurred during labor including fetal bradycardia with a supported sitting position, it was found to be statistically insignificant. This finding was consistent with another study, which revealed that only one woman had FHR <120 beats/minute.[11] The majority of primigravidae were delivered vaginally with no perineal tear because they all had episiotomy. These results were incompatible with the Cochrane review based on women assuming upright position revealed an association with reduced episiotomy (RR 0.75, 95% CI: 0.61-0.92)

Table 2: Effect of intervention on the duration of second-stage labor in experimental and control group by independent *t*-test (*n*=60)

Duration of second stage of labor (in minutes)	Experimental group (*n*=30)		Control group (*n*=30)		*t*	*P*
	f (%)	Mean (SD)	*f* (%)	Mean (SD)		
<45	28		16			
45-60	2	34.37 (6.30)	11	44.70 (7.28)	5.87	<0.001*
>60	0		3			

Level of significance $P \leq 0.05$, *—significant, *f*—frequency

Table 3: Frequency and percentage of maternal outcome in experimental and control group (*n*=60)

Maternal outcome	Experimental group (*n*=30) *f* (%)	Control group (*n*=30) *f* (%)	Chi-square/ Fisher test	*P*
Mode of delivery-				
Normal vaginal	30 (100)	28 (93.3)	2.06	0.15^{NS}
Instrumental	--	2 (6.6)		
Episiotomy-				
Yes	30 (100)	30 (100)	-	-
No	--	--		
Any perineal tear-				
Yes	--	--	-	-
No	30 (100)	30 (100)		
Any complications arise during labor-				
Yes	1 (3.4)	3 (10)	1.07	0.30^{NS}
No	29 (96.6)	27 (90)		
Blood loss more than 500 ml after the delivery-				
Yes	--	1 (3.4)	1.01	0.31^{NS}
No	30 (100)	29 (96.6)		
Stable maternal vital signs-				
Yes	30 (100)	29 (96.6)	1.01	0.31^{NS}
No	--	1 (3.4)		

f—frequency, NS—nonsignificant

Table 4: Effect of intervention on the APGAR score at 1 minute after birth in experimental and control group by independent *t*-test (*n*=60)

APGAR score	Experimental group (*n*=30)		Control group (*n*=30)		*t*	*P*
	f (%)	Mean (SD)	*f* (%)	Mean (SD)		
7-10	30	8.63 (0.56)	28	7.93 (0.78)	-3.98	<0.001*
4-6	0		2			
0-3	0		0			

Level of significance $P \leq 0.05$, *—significant, *f*—frequency

Table 5: Frequency and percentage of neonatal outcome in experimental and control group (*n*=60)

Neonatal outcome	Experimental group (*n*=30) *f* (%)	Control group (*n*=30) *f* (%)	Chi-square/ Fisher test	*P*
Baby cried immediately after birth-				
Yes	29 (96.7)	25 (83.4)	2.96	0.08^{NS}
No	1 (3.3)	5 (16.6)		
Need for stimulation-				
Yes	1 (3.3)	5 (16.6)	2.96	0.08^{NS}
No	29 (96.7)	25 (83.4)		
Need for resuscitation-				
Yes	--	1 (3.3)	1.02	0.31^{NS}
No	30 (100)	29 (96.7)		
Need for admission to NICU-				
Yes	--	1 (3.3)	1.01	0.31^{NS}
No	30 (100)	29 (96.7)		

and increased cases of second-degree perineal tears (RR 1.20, 95% CI 1.00-1.44) when compared with supine position during the second stage of labor.[4] With upright positions, there is less tear and episiotomy.[1,12] However, midwives should pay close attention toward perineum to prevent perineal trauma.[2] This suggests that nurse midwives must provide support and attention in a sitting position to avoid perineal tears and episiotomy. Providing supported sitting position to mothers delivering at primary health centers can help to reduce the duration of labor, promote normal delivery, and also help to reduce the number of referrals due to poor progress of labor.

This study also showed a significant effect of supported sitting position on improving APGAR score in newborns. This finding is consistent with other Indian studies, which reveal that upright positions are associated with higher APGAR score at 1 minute of birth.[1,7,11] On the contrary, Lawrence *et al.*[13] reported no difference between groups in the APGAR score less than 7 at 1 minute of birth. Moreover, an insignificant difference found in immediate crying of newborns and the need for stimulation.

The present study revealed a significant association between the duration of the second stage of labor with the height and intensity of maternal work. This may possibly explain why exercise and ambulation during pregnancy help to maintain upright positions easily at the time of labor. Furthermore, no demographic variable was significantly associated with APGAR score. Less sample availability might be a possible reason for not establishing significant results.

Limitations of this study included that the deliveries were not conducted by one resident to maintain a standardized intervention. Moreover, women assumed the position according to their capacity and required rest periods in between the bearing down efforts. This study was conducted at a single center. Therefore, findings cannot be generalized.

Conclusion

Positioning is one of the comfort measures used as a supportive technique during labor. This study concluded that the supported sitting position helps in the reduction of second stage of labor duration and improves the APGAR score. Therefore, this position can be used as a nursing intervention during the second stage of labor among mothers delivering at primary health centers. It is also suggested that similar studies should be done on large samples at a multicenter level and the same obstetrician and midwives must provide the intervention to avoid any potential bias.

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Table 6: Association of the second-stage labor duration among primigravidae with selected demographic variables (*n*=60)

Demographic variables	Duration of second stage of labor (in minutes) Experimental group *n*=30		Chi-square/ Fisher exact test	*P*	Duration of second stage of labor (in minutes) Control group *n*=30			Chi-square/ Fisher exact test	*P*
	<45	45-60			<45	45-60	>60		
Age (years)									
18-22	12	0	2.45	0.29^{NS}	8	5	2	0.59	0.96^{NS}
23-28	12	2			7	5	1		
29-35	4	0			1	1	0		
Height (cm)									
147-155	0	2	3.00	<0.001*	0	4	1	7.90	0.09^{NS}
155-165	24	0			13	6	1		
>165	4	0			3	1	1		
Weight (kg)									
45-55	5	1	3.21	0.36^{NS}	0	1	0	4.72	0.58^{NS}
55-65	11	0			8	5	3		
65-75	7	0			4	2	0		
>75	5	1			4	3	0		
BMI (kg/m^2)									
18.5-24.9	15	1	4.21	0.12^{NS}	7	4	2	1.91	0.75^{NS}
25-29.9	11	0			8	5	1		
≥30	2	1			1	2	0		
Gestational age (weeks)									
37-38.6	10	2	3.21	0.07^{NS}	6	5	1	0.23	0.89^{NS}
39-41.6	18	0			10	6	2		
Education			5.09	0.28^{NS}				4.24	0.64^{NS}
Elementary	4	1			1	1	1		
Secondary	9	0			4	1	0		
Graduate	11	0			8	7	2		
Post-graduate	4	1			3	2	0		
Intensity of maternal work									
Sedentary	3	1	2.54	0.02*	3	7	1	5.67	0.06^{NS}
Moderate	23	1			13	4	2		
Heavy	2	0			0	0	0		

Level of significance $P \leq 0.05$, NS—nonsignificant, *—significant

Conflicts of interest

There are no conflicts of interest.

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